

Subject : USSR/Electricity AID P - 3554
Card 1/1 Pub. 29 - 18/27
Authors : Fiskind, E. Yu. and I. S. Rapoport, Engs.
Title : ~~Reduction of losses in operating mercury arc rectifiers~~
Periodical : Energetik, 11, 24-25, N 1955
Abstract : The author describes five measures applied for the reduction of losses in operating mercury arc rectifiers of the RV-20 and RMNV-500 x 6 types with a rectified voltage of 230 v and a current of 2000 to 3000 a. One drawing.
Institution : None
Submitted : No date

A YA FISKIS

"Investigation of Noise-Equivalent Resistance of Some Types of Receiver-Amplifier Tubes" from Annotations of Works Completed in 1955 at the State Union Sci. Res. Inst. Min. of Radio Engineering Ind.

So: B-3,080,964

FISNER, B. - Vol. 3, no. 10, Oct. 1953. ZA SOCIALISTICKOU VEDU A TECHNIKU

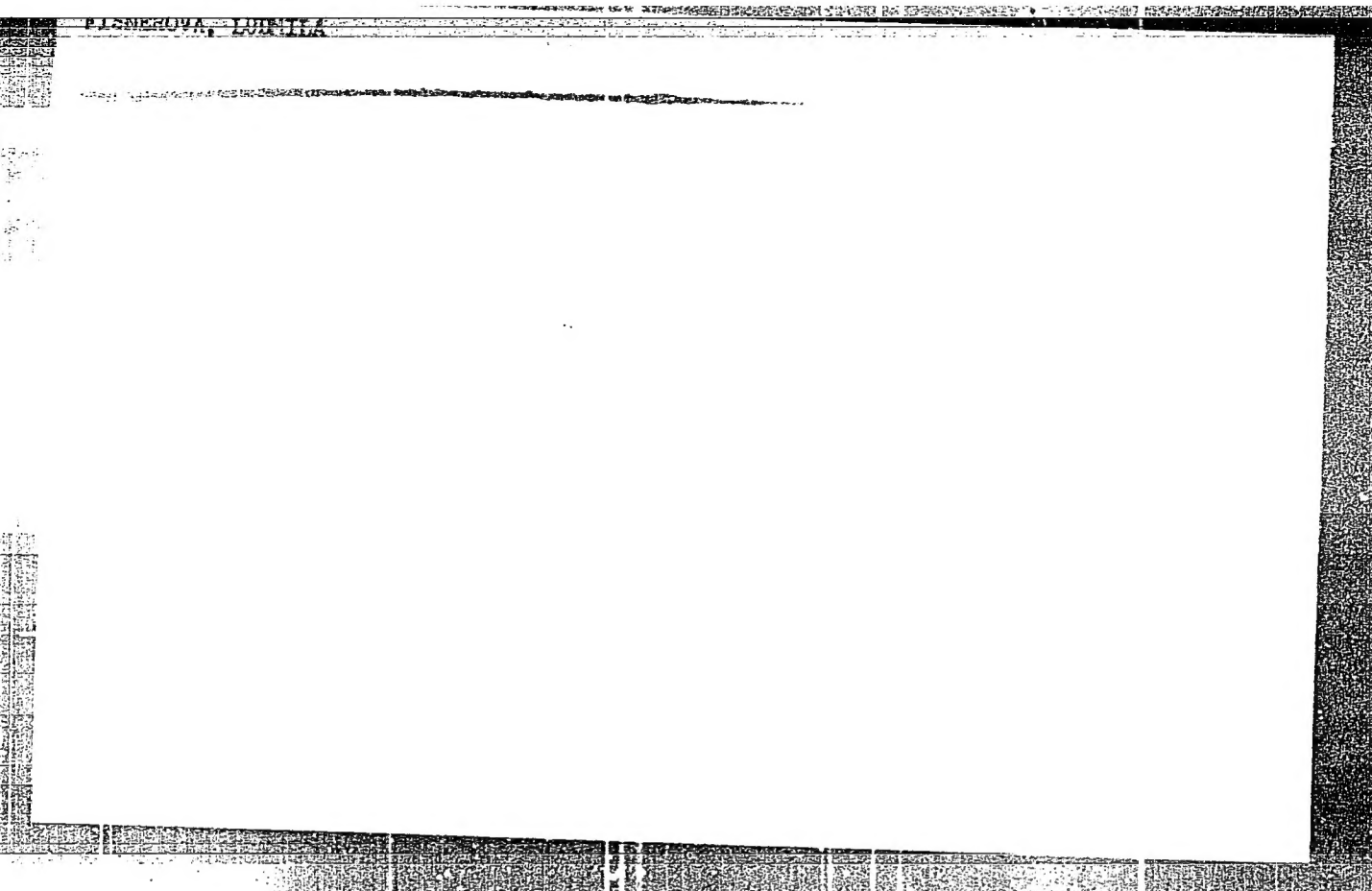
Method of improving the standard of living. p. 409.

Shortcomings in the application of results of concluded research work in the chemical industry. p. 441.

SO: Monthly list of East European Accessions, (EEAL), LC, Vol. 4, No. 9, Sept. 1955
Uncl.

"APPROVED FOR RELEASE: 06/13/2000

CIA-RDP86-00513R000413310016-2



APPROVED FOR RELEASE: 06/13/2000

CIA-RDP86-00513R000413310016-2"

FISSON, A. M.

PA 77T26

USSR/Engineering
Computers

Apr 1948

"The Introduction of Mechanized Computations - A
Vital National Economic Task," A. M. Fisson, 2½ pp

"Mekh Trud i Tyazh Rabot" No 4

Accounting in USSR appears to be very laborious task.
Author describes advantages to be gained from intro-
duction of mechanized methods for accounting and
making calculations.

77T26

FISTEAG, Ion

SURNAME, Given Names

Country: Rumania

Academic Degrees: -Dr.-

Affiliation: Scientific ^{Deputy} Adjunct-Director of the Zootechnical Research
Institute (Director-Adjunct Stiintific al Institutului de
Cercetari Zootehnice).

Excer

Source: Bucharest, Stiinta si Tehnica, No 8, Aug 1961, pp 40-41.

Data: "Local Breeds, Foundation for the Development of Our Zootechnology."

SPD 981643

FISTEK, Jozef

Mineral springs of Dlugopole-Zdroj, Nowa Bystrzyca, Szczawina
and Nowa Lomnica and the geological structure. Kwartalnik
geol 6 no.4:778-779 '62.

1. Instytut Geologii Inzynierskiej, Instytut Geologiczny,
Warszawa.

DUBECZ, Sandor, Dr.; FISTER, Tiborc, Dr.

Problems in the late therapy of intrapulmonary foreign bodies. *Magy. sebesset* 12 no.1:19-25 Mar 59.

1. A Budapesti Orvostudományi Egyetem II. sz. Sebészeti Klinikájának közleménye. Igazgató: Dr. Klimko Desso egyet tanár.
(LUNGS, for. bodies

late compl. of unnoticed for. bodies. prev. & ther. (Hun))

KESZLER, Pal, dr; POPOLCZY, Antal, dr.; KOZMA, Andor, dr.; FISTER, Tiborc, dr.

Spontaneous pneumothorax, based on 125 cases. Orv. hetil. 104 no.9:
367-391 3 Mr '63.

1. Janos Korhaz es Rendelointezet, Melkassobeszeti Osztaly.
(PNEUMOTHORAX) (EMFYEMA, TUBERCULOUS) (THORACOPLASTY)
(PNEUMONECTOMY) (DRAINAGE)

Surgery

HUNGARY

KESZLER, Pal, Dr. ~~FISTER, Tiborc, Dr.~~ Capital City Janos Hospital, Ward for Thoracic Surgery (chief physician: KESZLER, Pal, Dr) (Fovarosi Janos Korhaz, Mellkassebeszeti Osztaly), Budapest.

"Surgically Corrected Broncho-Biliary Fistula."

Budapest, Orvosi Hetilap, Vol 108, No 7, 12 Feb 67, pages 314-315.

Abstract: [Authors' Hungarian summary] The case of a 62 year old woman is described. Following cholecystectomy and surgery for an echinococcal abscess in the liver, a broncho-biliary fistula developed which had the clinical appearance of a pulmonary abscess. Because of the production of 1 1/2 liters of secretion mixed with bile daily and the accompanying septic-toxic state, the patient was in a very serious condition. The area of the abscess was opened and treated in this state. The bronchial and biliary fistula closed and the condition of the patient improved gradually. Within 3 years, there was a 30 kg weight gain. Attention is called to the advantages of the palliative operation used in the present case which was a complete success. 9 Eastern European, 10 Western references.

CA

11 H

The mutual action of neonalvarsan and tissue enzymes.
N. Allegretti and V. Fikler (Zavod za fiziol. med. fakulteta,
Zagreb, Yugoslavia). *Farm. Glasnik* 6, 7-13(1950).—
By use of Warburg's technique, it was detd. that neonal-
varsan (Novofenarsan "Pliva") inhibits tissue respiration
in the liver and kidney of rabbits and guinea pigs. These
tissues, on the other hand, inhibit the autoxidation of the
drug. The inhibition of autoxidation is not impaired by
the addn. of glutathione and 2,3-dimercaptopropanol.
Arsenoxides, $RAsO$, are not able to inhibit tissue respira-
tion; however, they are strong inhibitors of the oxidation
of succinic acid in the organs mentioned above. Succinic
dehydrogenase is an enzyme possessing sulphydryl groups
in its mol. The action of this enzyme can be inhibited by
the compds. which react with the sulphydryl groups, such as
arsenoxides. This inhibiting action is recoverable by
glutathione and 2,3-dimercaptopropanol. Expts. with
increasing concns. of 2,3-dimercaptopropanol show that
this compd. reacts in equimolar concns. with arsenoxide.
R. Proch

YUGOSLAVIA/Human and Animal Physiology. Internal Secretions.

T

Abs Jour: Ref Zhur-Biol., No 8, 1958, 36634.

Author : Alogzetti, N., Fistor, V., Gavric, D.

Inst :

Title : The Origin of Antidiuretic Factors in the Serum of Rats.

Orig Pub: Glasnik biol. sok. Hrvatsko. prirodosl. drustvo.
1953 (1955) ser 2b, 7, 92.

Abstract: No abstract.

Card : 1/1

Country : YUGOSLAVIA
Category: Human and Animal Physiology. Internal Secretion.
Pancreas

T

Abs Jour: RZhBiol., No 19, 1958, 89008

Author : Fister, V.; Allegretti, N.; Balenovic, K.; Munk, R
Inst : Croatian Natural Science Society
Title : The Diabetogenic Action of Pyromecasones.

Orig Pub: Glasnik bibl., sek. Hrvatsko prirodosl. drustvo,
1953 (1955) 2 D, 7, 148-149

Abstract: Pyromecasonc (I) in doses of 80 mg/kg causes diabetes in rats. Glycemia changes are similar to those following administration of Alloxan. I is toxic, it depresses the respiratory center, and the rats perish within 4 days. It is evident that the diabetogenic action is caused by the

Card : 1/2

T-70

FISTER, V.

Chemical Abst.
Vol. 48 No. 9
May 10, 1954
Biological Chemistry

(5)
The diabetogenic activity of 2,3,4-triketotetrahydropyridine. W. Allegretti, K. Balenović, V. Fister, and R. Munk (Univ. Zagreb, Yugoslavia). *Experientia* 9: 418-17 (1953) (in German).—Dosages of 80 mg. 2,3,4-triketotetrahydropyridine/kg. body wt. in white rats gave diabetogenic effects comparable to similar amts. of alloxan. It is suggested that the -COCOCONH group is responsible for this activity. D. S. Farina

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CIA-RDP86-00513R000413310016-2"

1. KTFP H/505/40

antidiuretic substance in the serum of diabetic rat
Miles Allegretti, Flora Gabor, and Victor E. Eder
Zuerich, Switzerland
1974

FISTER VJEKOSLAV

GERM.

BOZOVIC, L.J.; RABADIJA, L.; FISTER, V.

Diabetogenic activity of alloxan in acute hypoxia. Radovi Med. fak.
Zagreb 1:65-68 1957.

1. From the Institute of Physiology of Medical Faculty in Zagreb and
Institute of Pathophysiology of Medical Faculty in Zagreb.

(DIABETE MELLITUS, experimental,

eff. of hypoxia on diabetogenic eff. of alloxan (Ser))

(ANOXIA, effects,

on diabetogenic eff. of alloxan (Ser))

FISTER, V.; DAVILA, D.

Effect of the anemization and of chlorpromazine on the resistance of albino rats to acute hypoxia. Acta med. ingosl. 13 no.4:424-432 '59.

1. Zavod za patofiziologiju Medicinskog fakulteta u Zagrebu.
(ANEMIA exper.)
(CHLORPROMAZINE pharmacol.)
(ANOXIA exper.)

RABADIJA, Luka (Zagreb); FISTER, Vjekoslav (Zagreb); BAIC, Dusan (Zagreb)

The influence of zinc on the effectiveness of hypoglycemic sulfonamides. Biol glas 13 no.4:351-357 '60.

1. Zavod za fiziologiju Medicinskog fakulteta u Zagrebu i Zavod za patofiziologiju Medicinskog fakulteta u Zagrebu. 2. Clan Urednistva, "Bioloski glasnik; Periodicum biologorum" (for Fister)

(ZINC) (SULFONAMIDES) (HYPOGLYCEMIA)

FISTER, Vjekoslav (Zagreb); DAVILA, Dusan (Zagreb)

Chronic hypoxia and regeneration of thyroid gland in rat. Biol glas
13 no.4:401-402 '60.

1. Zavod za patolosku fiziologiju Medicinskog fakulteta Sveucilista
u Zagrebu. 2. Clan Urednistva, "Bioloski glasnik; Periodicum
biologorum" (for Fister).

(HYPOXIA) (RATS)

DAVILA, Dusan; FISTER, Vjekoslav; BAIC, Dusan, JANJIC, Ivan

Influence of thyroidectomy and largactil on the body weight and on the polycythemia caused by a chronic intermittent hypoxia in albino rats. Biol glas 14 no.1/2:77-86 '61.

1. Zavod za patolosku fiziologiju Medicinskog fakulteta Sveucilista u Zagrebu. 2. Clan Urednistva, "Bioloski glasnik, Periodicum biologorum" (for Fister).

*

YUGOSLAVIA

FISTER, Vjekoslav, Department of ratophysiology (Zavod za patolosku fiziologiju) Medical Faculty, University of Zagreb.

"Carbohydrate Metabolism and Survival of Rats from Acute Hypoxia."

Zagreb, Radovi Medicinskog Fakulteta u Zagrebu, Vol 11, No 1, 1963; pp 51-75.

Abstract [German summary modified]: starvation for 12 or 24 hours, or 30 minutes of 250-mm.-Hg (i.e. 9,000 m. altitude) hypoxia in rats so previously starved, or in alloxan-diabetic ones, all increased glycemia. Insulin hypoglycemia was not affected in any group by such procedures but hypoxia did decrease insulin refractoriness; an antidiabetic sulfonamide had effect similar to that of insulin. Chlorpromazine potentiated glycemic effect of hypoxia and also increased susceptibility of rats to hypoxia. Six tables, 91 Western references.

1/1

FISTER, Vjekoslav; DUSAN, Davila; IVANCEVIC, Darko; SUDROVIC, Ivan

Effect of thyroidectomy on the erythrocyte and reticulocyte number,
hemoglobin concentration and blood volume in the rat. Rad. med. fak.
Zagreb 12 no.1:5-18 '64.

Plavik, Vjekoslav; DUBAN, Davila

Serum proteins in the rat following the administration of
chlorpromazine and in chronic hypoxia. Rad. med. fac. Zagreb
12 no.1:79-83 '64.

FISTER, V.

Cortisone treatment, and the glycogen fractioning in the rat liver. Bul so Youg 9 no.4/5:106-107 Ag-0 '64.

1. Physiological Institute of the Faculty of Medicine, Zagreb.

FISTROVIC, Vjekoslav, inz.

Lamination, a modern method for the construction of wooden ships.
(To be contd.) Brodogradnja 7 no.4:166-183 '56.

FISTROVIC, Vjekoslav, inz.

Lamination, a modern method for the construction of wooden ships.
(Conclusion) Brodogradnja 7 no.5:195-203 '56.

FISTUL, G. F., Maj. of the Med. Serv.

"Conducting Evening Conferences on Medical and Natural-Science Topics" Voenno-meditsinskiy zhurnal, No. 8, 1955, pp.82-83.

Translation 552232

FISTUL, G. R.

"Conducting Evening Conferences on Medical and Natural-Science Topics",
Military-Medical Journal, No. 8, p 82, 1955.

FISTUL, G., podpolkovnik meditsinskoy sluzhby

Medical training on ships must be given constant attention. Tyl
1 snab.Sov.Voor.Sil 21 no.';27-29 Ja '61. (MIRA 14:6)
(MEDICINE, NAVAL)

FISTUL, G.R., podpolkovnik meditsinskoy sluzhby

A university of health on ships. Voen.-med. zhur. no.4:70
Ap '61. (MIRA 15:6)

(HEALTH EDUCATION)

FISTUL', V.I.

Category : USSR/Electronics - Vacuum Technique

H-9

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 4391

Author : Rubinshteyn, R.N., Fistul', V.I.

Title : Method of Graduating Thermoelectric Manometers

Orig Pub : Zavod. laboratoriya, 1956, 22, No 2, 241-244

Abstract : Description of a method for plotting the graduation curve of a thermoelectric manometer from the voltage-current characteristics of the latter, plotted at a constant pressure, and using one point on the pressure-dependence curve. The method is suitable for all gases and vapors.

Card : 1/1

FBIHQ, V I

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1556
 AUTHOR FAJNSTEJN, S.M., FISTUL', V.I.
 TITLE The Determination of the Gaseous Microadmixtures in the Surface
 Layers of Germanium.
 PERIODICAL Zurn.techn.fiz., 26, fasc.10, 2162-2164 (1956)
 Issued: 11 / 1956

These admixtures are able, already in small quantities, to exercise considerable influence upon the electric properties of the material or of the device made therefrom. The first stage of these investigations is restricted to the determination of gaseous admixtures in thin germanium plates. Investigation was carried out by means of the Soviet mass spectrometer MS - 2. For gas analysis a special device for the vacuum extraction of the gases from the metals and for the introduction of the gases into the mass spectrometer was constructed. For H_2 , O_2 , N_2 , Cl_2 , CO_2 and H_2O and in the pressure range of from 10^{-5} to 10^{-1} mm Torr, the intensity of the line I_M of every gas depends linearly on the pressure P_M in the system.

Results obtained and their discussion: Germanium crystals with a pickled surface were examined. The composition of the pickling agents and the results of the analysis of the gases which were liberated from the samples pickled with these agents for several hours at $120^\circ C$ are shown in a table. The surface of the pickled germanium samples contains considerable quantities of gas and the composition of the gases depends on the composition of the pickling agent and on the

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Zurn.techn.fis,26, fasc.10, 2162-2164 (1956) CARD 2 / 2

PA - 1556

pickling process. Most probably a considerable amount of water is absorbed before and after drying of the samples (if they are kept accessible to air). H_2O_2 + oxalic acid proved to be the best pickling agent. The data obtained confirm the usefulness of a surface protection of the crystal after pickling.

This protection is afforded by a special coating applied in a chamber with reduced humidity, if possible in a gas that is indifferent to germanium. The influence exercised by CO , CO_2 + H_2 and CH_4 -traces on electric properties has

hitherto not been the object of much investigation. On the basis of the results obtained it may be said that investigations carried out by means of a mass spectrometer may be of advantage for the development of a suitable technology of working out stable semiconductor devices.

INSTITUTION:

FISTUL', V. I. Cand Tech Sci -- (diss) "Study of the dynamics of the ^{liberation} ~~evolution~~
of gas from copper, aluminum, mickel, and certain other electric-vacuum materials
by the ^{of} method of mass spectrometry." Mos, 1957. 14 pp 21 cm (Min of Radio
Engineering Industry USSR. State Union Sci Res Inst, 100 copies (KL, 14-57, 87)

AUTHOR: Fistul', V.I.

32-12-23/71

TITLE: A Mass-Spectrometric Method for the Investigation of the Kinetics of the Separation of Gas From Metal (Mass-spektrometricheskiy metod issledovaniya kinetiki vydeleniya gazov iz metallov).

PERIODICAL: Zavodskaya Laboratoriya, 1957, Vol. 23, Nr 12, pp. 1448-1451 (USSR)

ABSTRACT: The method was worked out on the spectrometer "MC-2" and on an additional device (which is described). The device consists of an electric furnace into which the sample is introduced in a quartz ampule, of a thermoelement, which is connected with the sample, of a collecting vessel for gas, which is provided with a tube for measuring gas pressure, and of a number of gas containers which are connected with the apparatus by means of faucets allowing the passage of exactly predetermined quantities. The collecting vessel is connected to a diaphragm, from which gas is conveyed through a capillary tube of 30 " to the spectrometer, and, on the other hand, to a system of thin tubes of different transmissivity, of which each is provided with a faucet of its own. By means of these tubes the other gases are drained off from collecting vessels and, at the same time, the kinetics of the gases separated from the sample is determined (measured) by a suitable selection of this tube. At first the graduated

Card 1/2

A Mass-Spectrometric Method for the Investigation of the
Kinetics of the Separation of Gas From Metal

32-12-23/71

scale concerning gases, which are usually separated from metals (H_2 , O_2 , N_2 , Cl_2 , CO , CO_2 and H_2O) is given. These gases were individually allowed to pass through the faucet in portions; their data were recorded by the pressure measuring tube and in the spectrometer, for which purpose the ionization voltage of 40 V and the electron emission current of 1.5 mA were used. The samples themselves were then examined. A sample was introduced into the quartz ampule of the additional device and closed in. The electric furnace was pushed over it. The gases separated after heating of the sample enter the collecting vessel, from where small quantities are conveyed through a capillary tube to the spectrometer, while the bulk of them is removed through tubes of the draining system; these tubes are chosen in such a manner that a constant pressure is measured in the collecting vessel. The combination of the tubes put into action determines the velocity of gas separation. If, in this connection, the intensity of each of the respective spectral lines is taken into account experimentally, it is possible to determine the final kinetics of gas separation by graphoanalysis and by computation. There are 3 figures, 3 tables, and 6 references, 5 of which are Slavic.

AVAILABLE:
Card 2/2

Library of Congress

1. Metal-Gas separation 2. Furnace-Electric-Characteristics

SOV/120-58-4-18/30

AUTHORS: Rubinshteyn, E.N. and Fistul', V.I.

TITLE: The PGA-1 Panoramic Non-Inertial Analyzer of Multi-Component Gas Mixtures (Panoramnyy bezynertsionnyy analizator mnogokomponentnykh gazovykh smesey PGA-1)

PERIODICAL: Pribery 1 tekhnika eksperimenta, 1958, Nr r, pp 82- 89 (USSR)

ABSTRACT: The analysis of the gas is made by determining the mass numbers of the components of the gas mixture. The analyzed gas is admitted to the instrument consisting of an ion source, ion drift space and ion detector. The atoms and molecules of the gas are ionised by electron impact and are separated out according to mass. This separation is carried out by a time of flight method. A block diagram of the instrument is shown in Fig. 1, the ion source in Figs. 2 and 3, and a photograph of the instrument is shown in Fig. 4. The generator of ionising pulses which govern the electron current in the ion source is triggered by a blocking oscillator. The ion packets which come out of the ion source traverse the drift space and are then detected by an electron multiplier which transforms the ion current into an amplified electron current. The instrument will record processes 0.002 s long

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SOV/120-58-4-18/30

The PGA-1 Panoramic Non-Inertial Analyzer of Multi-Component Gas Mixtures

or more. The resolving power measured from the width of the peaks at their half height is about 30 in the mass number region of 30. A similar instrument has been described by Wiley and McLaren (Ref 4) and has a higher resolving power but is more complex. The instrument will record mass numbers between 2 and 70 and has a power intake of 400 W. The mass spectrum is shown in the form of a panorama of peaks on a CRO screen. N.I. Ionov, E.Ya. Zandberg, B.A. Mamyurin and Ye.I. Agishev are thanked for taking part in the development of the industrial instrument and B.G. Mendeleyev for the direction of this work. S.D. Bogin is thanked for assistance. There are 11 figures, 1 table and 4 references, 2 of which are Soviet.

SUBMITTED: August 26, 1957.

Card 2/2

24 (2), 24 (3)

AUTHORS:

Rubinshteyn, R. N., Fistul', V. I.

SOV/20-125-3-21/63

TITLE:

The Determination of the Surface Conductivity of
Semiconducting Crystals by the Method of the "Wedge"
(Opredeleniye poverkhnostnoy provodimosti poluprovodnikovyykh
kristallov metodom "klina")

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 3,
pp 542-545 (USSR)

ABSTRACT:

For the investigation of the surface properties of germanium and silicon it is advantageous to have a method (among the other methods) for the unequivocal determination of the surface conductivity σ_{sur} . It is assumed that the surface conductivity may cause a certain (sometimes very essential) increase of the reverse current in the semiconductor diodes. The methods of the surface treatment of germanium (silicon) crystals in any practical case must change the surface conductivity, but the hitherto published papers contain no information concerning direct methods for the measurement of this surface conductivity. In the present paper, a method is proposed for the immediate measurement of σ_{sur} , which the

Card 1/4

The Determination of the Surface Conductivity of
Semiconducting Crystals by the Method of the "Wedge"

SOV/20-125-3-21/66

authors call the "wedge" method. The first paragraph of the present paper deals with the theory of this method. It relies on the ordinary two-point method for the measurement of the specific resistance of semiconducting crystals. The sample used for the measurements must have the shape of a wedge. Formulae are given or derived for the surface current, for the volume current, and for the surface conductivity. By measuring the gradient of the potential along the wedge and by evaluating the results found according to the above-mentioned formulae the volume conductivity and the surface conductivity can be determined. Conditions for the validity of the above-mentioned equations are discussed in short:

- 1) The current lines within the wedge must have a small value of the curvature.
- 2) The contact metal-semiconductor in the places of current supply must be Ohmic.
- 3) The material of the wedge must be homogeneous.

The first condition is quite acceptable for small angles α of the wedge. The above-mentioned equations begin to hold at a certain distance from the contacts where the energy barriers and the injections of the charges exert no influence any longer. The third

Card 2/4

The Determination of the Surface Conductivity of
Semiconducting Crystals by the Method of the "Wedge"

SOV/20-125-3-21/53

condition is rarely satisfied in practice. The second paragraph of the present paper deals with the experimental results. In order to verify this method, the authors prepared wedge-like samples of monocrystalline germanium and silicon of different specific electric resistance. These wedges had angles of 5° . A diagram shows the distribution of $d\varphi/dx$ for 2 characteristic cases. $d\varphi/dx$ denotes the gradient of the potential in the point x . The third diagram gives the results of the measurement of the quantity $A = 2\sigma_{\text{sur}} + ((2\sigma_{\text{sur}}/S) + \sigma_0) \times tg\alpha$ for a sample of homogeneous germanium before and after etching in H_2O_2 . The evaluation of the results permits the following conclusion: The etching changes the surface conductivity from $0.28 \cdot 10^{-2} \text{ Ohm}^{-1}$ to $0.15 \cdot 10^{-2} \text{ Ohm}^{-1}$. The investigation of a wedge produced from inhomogeneous germanium offered similar results as in the above-mentioned case. In several cases, the above-discussed method was applied also to silicon samples. The results agree well with

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The Determination of the Surface Conductivity of
Semiconducting Crystals by the Method of the "Wedge"

SCV/20-125-3-21/65

those of measurements according to the two-sound method. The
"method of the wedge" permits comparative measurements of
surfaces treated in different ways in order to find a manner
of treatment which offers a minimum value of surface
conductivity. There are 4 figures and 1 Soviet reference.

PRESENTED: December 25, 1958, by A. F. Ioffe, Academician

SUBMITTED: December 15, 1958

Card 4/4

122
USE OF X-RAY DIFFRACTION PHASE ANALYSIS FOR THE DETERMINATION OF CASES IN
GROWING AND STANDING STEEL
Metals

FISTUL', V.I.

Mass spectrometric method of determining the concentration and
diffusion coefficients of gases in metals. Trudy kom. anal.

khim. 10:71-81 '60.

(MIRA 13:8)

(Diffusion)

(Gases in metals)

9.4300 (1035, 1138, 1143)

26.1631

S/181/60/002/009/026/036
B004/B056

AUTHORS: Fistul', V. I., Orzhevskiy, O. B.

TITLE: The Conductivity of n-p Junctions in the Blocking Direction

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 9, pp. 2214-2217

TEXT: It was the aim of the authors to find the function $f(E)$ which depends on the voltage of the field E in the n-p junction, on the basis of the equation $j = A \exp\{-[q\psi - f(E)]/kT\}$ (2). (ψ = activation energy of the formation of minority carriers). As only $f(U)$ can be determined experimentally (U = voltage at the n-p junction), the authors, by using $E = |U|/L(U)$ (3), where $L(U)$ is the thickness of the junction, and $L = cU^m$ (4) (c = capacitance), derived the equation $j = A \exp\{-[q\psi - BU^{(1-m)}]/kT\}$ (5). $\alpha(1-m)$ is measurable experimentally. Measurements on germanium diodes with $m = 0.5$ and 0.3 and on silicon diodes with $m = 0.5$ led to the dependence $j = A \exp[-(q\psi - a\sqrt{E})/kT]$ (6), where a is a constant of proportionality. The voltage dependence of the reverse current is linear in the coordinates $\log j, U^{(1-m)/2}$ (Fig. 1). In diodes

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The Conductivity of n-p Junctions in
the Blocking Direction

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B004/B056

whose capacitance drops considerably at low negative voltages, $L = \text{const}$, and the rectification of the reverse branch of the current-voltage characteristic occurs in the coordinate system $\log j, \sqrt{U}$ (Fig. 2). Fig. 3 shows the current-voltage characteristic of the reverse current of selenium rectifiers ($\log j, U^{0.4}$). The authors then discuss an empirical equation mentioned in Ref. 5. They note that within the range investigated no difference from the result obtained from equation (5) occurs, but that such a difference is to be expected for a transition to low voltages and high temperatures. The non-occurrence of the saturation of the reverse current in n-p junctions in germanium, silicon, and selenium is explained by a decrease of the activation energy φ by $\Delta\varphi \sim \sqrt{E}$, which is caused by the field of the junction. There are 4 figures and 5 Soviet references. 4

SUBMITTED: December 14, 1959

Card 2/2

5.4600
5(4)
AUTHORS: Fistul', V. I., Andrianov, D. G.
TITLE: Adsorption-induced Changes in the Surface Conductivity of Germanium
PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 2, pp 374 - 376 (USSR)
ABSTRACT: It was the aim of the present paper to find out in what way surface conductivity changes if the germanium electrode during etching adsorbs impurities from the etching medium. The experiments were made with monocrystalline n-germanium which had a resistivity of 40 ohm.cm. The etching reagent was produced from HNO_3 , HF, and CH_3COOH in a ratio of 3:2:1. The acids were twice distilled, so that their impurity-content did not exceed $10^{-6}\%$. During the experiments the etching reagent was given additions of Cu, K, Cr, Fe, Zn, Cd, Ca, Ag and the change in surface conductivity was measured (Table 1). As shown by figure 1, surface conductivity increases if the etching reagent contains impurities of Fe, Cu, K, Cr, Ca or Ag. On the other hand, surface

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21

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67579

Adsorption-induced Changes in the Surface Conductivity SOV/20-130-2-37/69
of Germanium

conductivity decreases in the presence of Zn and Cd. These experiments indicate the possibility of producing a germanium surface having a desired surface conductivity by the adsorption of certain impurities or of combinations of such. In conclusion it is mentioned that the authors thank M. L. Ioselevich for taking part in this work. There are 1 figure, 1 table, and 2 Soviet references.

PRESENTED: September 15, 1959, by A. N. Frumkin, Academician

✓

SUBMITTED: September 9, 1959

Card 2/2

ELSTUL', V.I., kand. tekhn. nauk, red.; DANILOV, N.A., red.; KOROTEYEVA,
Yu.I., tekhn. red.

[Tunnel diodes] Tunnel'nye diody; sbornik statei. Moskva, Izd-vo
inostr.lit-ry, 1961. 203 p. (MIRA 14:12)
(Diodes) (Transistors)

22049

S/181/61/003/004/015/030
B102/B214

24.7400 (1048, 1151, 1158)

AUTHORS: Ioselevich, M. L. and Fistul', V. I.

TITLE: Experiments on the change of surface conductivity of germanium and silicon

PERIODICAL: Fizika tverdogo tela, v. 3, no. 4, 1961: 1132-1136

TEXT: Since a semiconductor crystal possesses surface states that are only half filled with electrons, a surface conductivity σ_s appears which shunts the p-n junction in semiconductor devices and causes an increase in the reverse-current intensity. Its fluctuations result in an instability of the parameters of the semiconductor device. In general, an attempt is made to lower σ_s by etching (i.e., removal of the surface layer with the distorted structure). But in fact this is only a first step to obtain controlled surface properties. Here, experiments are described for regulating σ_s . These experiments were made on n-type and p-type single crystals of Ge and Si. σ_s was measured by the wedge method (see Fig. 1). The wedge-shaped sample along which the volume-to-surface ratio (and so also the potential gradient $\nabla\phi$) changes, is traversed by a current applied at the contacts \odot . Then,
$$I/\sqrt{S} = 2\sigma_s + (2\sigma_s/S + \sigma_0)x \cdot \tan \alpha,$$
 where σ_0 is the volume conductivity. One Card 1/6

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Experiments on ...

of the possibilities of influencing the surface charge consists in the adsorption of different substances. In the experiments described here, the film was adsorbed from the etching agent CP-4 (SR-4) which contained different elements. The content of each individual impurity (cf. Table 1) in the etching agent did not exceed 10-6%. It was found that the majority of the substances increased σ_s ; only Zn, Cd, and Br lowered it. The change of σ_s as a result of the introduction of the surface impurity is also given in Table 1. As experiments with tracer atoms showed, all impurities with the exception of Ag formed layers less than one atom thick. Thus, for example, $\text{Cu} \sim 10^{-8} \text{ g/cm}^2$, $\text{Cr} \sim 5 \cdot 10^{-10} \text{ g/cm}^2$, i.e., ~ 0.1 and ~ 0.001 of a monatomic layer. Therefore, one can alloy the surface by adsorption from an etching agent so that one can speak of "donor-type" and "acceptor-type" surface alloys. Elements of one and the same group can also have opposite effects in this sense. Between the sign of the change of σ_s and the ionization potential U_{ia} of the adsorbed atom there exists a relationship which is shown in the following table:

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S/181/61/003/004/015/c 30
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Experiments on ...

Element	$U_{ia}, \text{ ev}$									
	4.3	6.1	6.7	7.6	7.7	7.8	8.1	9.0	9.4	11.8
	K	Ca	Cr	Ag	Cu	Fe	Ge	Cd	Zn	Br
	$\leftarrow \sigma_s / \sigma_{so} > 1 \rightarrow$						$\leftarrow \sigma_s / \sigma_{so} < 1 \rightarrow$			

There exists a critical potential U_{cr} for which $U_{ia} < U_{cr}$ if $\sigma_s / \sigma_{so} > 1$, and $U_{ia} > U_{cr}$ if $\sigma_s / \sigma_{so} < 1$. Another possibility of lowering σ_s consists in applying special coatings (oxidizers or reducers). As a reducer, the authors used SnCl_2 which is particularly suitable for work in air. The coating was done from a 2% solution in acetone. Such a coating on an n-type material increases the n-type property; on a p-type material, it leads to the formation of a layer of inversion. Oxidizers act conversely. A reducer lowers σ_s on n-type material and increases it on p-type material; the effect of oxidizers is again opposite. The higher the resistivity of the material, the more intense is the action of both coatings. The effect of SnCl_2 on the Card 3/6

22049

S/181/61/003/004/015/030
B102/B214

Experiments on ...

volt-ampere characteristics of n-type Si were also investigated. It was found that SnCl_2 lowers the surface-recombination rate of the carriers (an oxidizer on p-type material has the same effect). The authors thank D. G. Andrianov and N. A. Glukhareva for collaboration. There are 2 figures, 3 tables, and 7 references: 2 Soviet-bloc and 5 non-Soviet-bloc.

SUBMITTED: July 21, 1960

Legend to Table 1: 1) element; 2) compound in which the element is introduced in the etching agent; 3) quantity of the element in the etching agent (wt %); 4) σ_s/σ_{s0} (σ_{s0} - value before etching); 5) filings.

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22053

S/181/61/003/004/019/030
B102/B214

9.4340(1003, 1143, 1150)

AUTHORS:

Fistul', V. I. and Orzhevskiy, O. B.

TITLE:

Temperature dependence of the conductivity of p-n junctions in the inverse direction

PERIODICAL:

Fizika tverdogo tela, v. 3, no. 4, 1961, 1158-1160

TEXT: The authors have already shown in a previous paper (FTT, II 2214, 1960) that for many p-n junctions, the dependence of the current j in the inverse direction on the potential U is given by

$j = A \exp[-(q\varphi - BU^{(1-m)/2})/kT]$ (1), where $m < 1$. For most industrial diodes, m can be set equal to zero. From this relation, the activation energy φ can be determined. If (1) is plotted in a semilogarithmic coordinate system, the angle of slope of the straight line is:

$\alpha = \frac{d \ln j}{d(1/T)} = -\frac{q\varphi}{k} + \frac{B}{k} U^{(1-m)/2}$, from which φ can be determined. This is done according to the relation $\frac{k}{q} |\alpha|_{U=0} = \varphi$. The authors studied the temperature dependence of the inverse current of the following industrial Ge Card 1/5

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Temperature dependence ...

and Si diodes: 1N38A, 1N39A, 1N54A, $\Delta\Gamma\Delta$ -8 (DGTs-8), $\Delta\Gamma\Delta$ -21 (DGTs-21), $\Delta\Gamma\Delta$ -24 (DGTs-24), 1N457, 1N458, 1N459, 1N464, and of the Se diodes ABC-18, ABC-25, ABC-60, TBC-40-142, BC-130. [Abstracter's note: It is not possible to decide whether the notations are in Latin or Cyrillic characters.] In all cases, the experimental points fit the straight line $\log j = f(1/T)$ very well (see Fig. 1). The potential dependence of the slope angle found experimentally for some diodes is shown in Fig. 2. The φ values determined by extrapolation were as follows:

	Ge			Si			Se		
no.	1	2	3	4	5	6	7	8	9
φ [ev]	0.73	0.67	0.70	0.53	0.20	0.90	0.6	0.46	0.32

The numbers are identical with those in Fig. 2. In the case of Ge diodes, the φ values were equal to the forbidden-band width within the limits of accuracy ($\sim 15\%$). In the case of Si diodes, φ was only in one case comparable to the forbidden-band width; otherwise it was smaller or equal to half its value. At the potential U_k defined by Eq. (4), the temperature dependence

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B102/B214

Temperature dependence ...

of the inverse current shows a change of sign. Fig. 3 shows that the selenium p-n junctions have only a small γ ; the change of sign as dependent of temperature is well observable. There are 3 figures, 1 table, and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: August 10, 1960 (initially) and December 6, 1960 (after revision)

Card 3/5

S/181/61/003/005/040/042
B111/B202

9,4300 (1150, 1151, 1136)

AUTHORS: Fistul', V. I. and Gubenko, A. Ya.

TITLE: Resistivity of high-alloy germanium

PERIODICAL: Fizika tverdogo tela, v. 3, no. 5, 1961, 1617-1619

TEXT: In low-alloy semiconductors (without degeneration) the mobility of the carrier and hence also the resistivity of a crystal are mainly determined by the scattering of the carriers from ionized impurities and from the elastic lattice vibrations. With low impurity content of the semiconductor the experimental results are in good agreement with the theoretical ones. As was shown by V. A. Johnson and K. Lark-Horowitz (Phys. Rev., 71, 374, 1947) resistivity (ρ) depends on the impurity concentration N in the following

way: $\rho = 6270 \cdot N^{-1/3}$ ohm.cm. The experiments were made with a Ge single crystal which had been purified such that the resistivity was 50 ohm.cm. Then, it was alloyed by Chokhralskiy's method of pulling it from the melt. Arsenic was used as impurity. It was introduced into the melt in the form of Ge + (15-20%) As. Specimens with the dimensions $10 \cdot 4 \cdot 1$ mm were cut out from the pieces obtained. The experimental results were represented in the Card 1/3

23135

S/181/61/003/005/040/042
B111/B202

Resistivity of ...

figure (Curve 1) (n-the carrier concentration). The dashed curve shows the relation obtained by Johnson and Lark-Horowitz. The deviation between the experimental results and the relation obtained by Johnson - Lark-Horowitz does not exceed 17 %. Due to this small deviation the conclusions drawn by Johnson and Lark-Horowitz are wrong. Curve 2 shows the dependence of the p-type conductivity of germanium which had been obtained from the data of Ref. 8 (F. A. Trumbore, A. A. Tartaglia, J. Appl. Phys., 29, 1511, 1958). The authors give two empirical formulas for the dependence of the of the resistivity of germanium: a) for n-type: $\rho_n = 4.3 \cdot 10^8 \cdot n^{-0.6}$ and b) for p-type germanium: $\rho_p = 8.15 \cdot 10^9 \cdot n^{-0.66}$. There are 1 figure and 8 references: 2 Soviet-bloc and 6 non-Soviet-bloc

SUBMITTED: December 19, 1960

Card 2/3

5.5400

27835
S/032/61/027/010/011/022
B104/B102

AUTHORS: Orzhevskiy, O. B., and Fistul', V. I.

TITLE: Investigation of the inhomogeneity of semiconductor materials using probes

PERIODICAL: Zavodskaya laboratoriya, v. 27, no. 10. 1961, 1236 - 1239

TEXT: It was the aim of the present paper to improve the determination of resistivity inhomogeneities of semiconductor materials. The authors studied the resolving power of such methods for determining inhomogeneities as use one, two, or four probes. The investigations were based on the assumption of inhomogeneities of the simplest form: a jump of the conductivity of the material at a certain boundary. In a measuring system operating with probes, the resistance of the material between the probes will in this case depend on the magnitude of the inhomogeneity and its relative position to the probes. It is shown that the resolving power of the four-probe method is only half that of the two-probe method. The necessity of knowing the cross section area of the specimen between the probes is the main drawback of the two-probe method. To increase the resolving power of the two-probe method, it is necessary to reduce the

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Investigation of the inhomogeneity...

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S/032/61/027/010/011/022
B104/B102

distance between the two probes, since the method yields a resistivity averaged over the probe distance. The shortest distance attainable in practice is about 0.25 mm. 3 to 5 hours are required in this case for measuring the inhomogeneities of a semiconductor 200 mm in length. The time required for the measurement can be shortened by applying movable probes with automatic recording. In this case it is impossible to attain a distance of less than 5 mm between the probes. The dependence of the voltage between the probes on the inhomogeneities is discussed in detail, and it is shown that, with the use of movable probes, the error in voltage measurement amounts to about 0.25%. Finally, a one-probe method is described. The probe is moving across the specimen whose cross section area must be exactly known. Current flows through the specimen, and the voltage drop between the end of the specimen and the probe, occurring as the result of a uniform movement of the probe, is recorded by a differentiating circuit. This method is very promising owing to its great resolving power. A probe of this type is shown in Fig. 3. For the purpose of reducing the friction of the probe sphere, the probe head is provided with a roller. There are 3 figures and 3 references: 2 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: National Card 2/3 X

Investigation of the inhomogeneity...

Electronics Conference, v. 14.

27835

S/032/61/027/010/011/022
B104/B102

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut
redkometallicheskey promyshlennosti (State Scientific Research
and Planning Institute of the Rare Metals Industry)

Fig. 3.

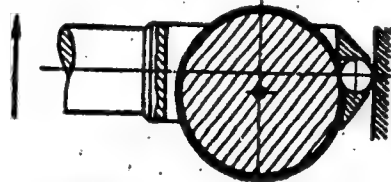
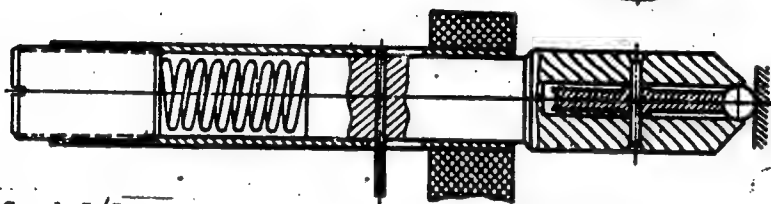


Fig. 3. Movable probe.



Card 3/3

RUBINSHTEYN, R.N.; FISTUL', V.I.

Method for evaluating the concentration distribution of alloying
admixtures in a fused in p-n junction. Zav.lab. 27 no.10:1242-1246
'61. (MIRA 14:10)

(Indium-geranium-gallium alloys)

S/058/63/000/003/071/104
A059/A101

AUTHORS: Fistul', V. I., Abezgauz, I. D.

TITLE: The estimation of some conditions necessary for the formation of germanium p-n tunnel junction

PERIODICAL: Referativnyy zhurnal, Fizika, no. 3, 1963, 67, abstract 3E462
("Tr. Soveshchaniya po udarn. ionizatsii i tunel'n. efektu v poluprovodnikakh, 1960", Baku, AN AzerbSSR, 1962, 151 - 158)

TEXT: The calculation of the impurity concentration in the recrystallized region of the p-type was performed on melting In+Ga or Sn+Ga into n-type Ge. The calculated results are represented in the form of the dependences of the concentration of P on the percentage of Ga in the fused-in In or Sn drop and on the temperature of melting-in. The diagrams are valid only for equilibrium conditions of growth in the recrystallized region, i.e. for slow cooling after fusion. Thus, on melting In + 2% Ga at 600°C, the equilibrium concentration in p-region is shown to be 10^{19} cm^{-3} . On fast cooling, the concentration in the p-region can be somewhat higher. A qualitative agreement was observed between

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The estimation of some conditions...

S/058/63/000/003/071/104
A059/A101

the results of calculation and those of experiment.

A. Kovalev

[Abstracter's note: Complete translation]

Card 2/2

24.7700

96394
S/181/62/004/004/039/042
B102/B104

AUTHORS: Fistul', V. I., Iglitsyn, M. I., and Omel'yanovskiy, E. M.

TITLE: Electron mobility in germanium highly alloyed with arsenic impurity

PERIODICAL: Fizika tverdogo tela, v. 4, no. 4, 1962, 1065-1067

TEXT: The mobility of electrons was measured as dependent on their concentration in the range 77 - 300°K (in some cases 4.2-300°K) in n-type Ge single crystals doped with As (10^{15} - $4 \cdot 10^{19}$ cm⁻³). In the electron concentration range $4 \cdot 10^{17}$ - $4 \cdot 10^{19}$ cm⁻³ the electron mobility dependence satisfies the empirical law $\mu = 1.52 \cdot 10^{10} n^{0.4}$ cm²/v·sec. Since the Hall constant in highly alloyed Ge is temperature independent in the range 4.2 - 300°K, i. e., all As atoms are totally ionized; the function $\mu(T)$ coincides with $\sigma(T)$ (σ - conductivity). The $\mu(T)$ curves have an unexpected course as they have no indication to a scattering from thermal lattice vibrations. The most probable explanation of this result is the

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Electron mobility in germanium highly ... S/181/62/004/004/039/042
B102/B104

assumption of a reduction of mobility due to scattering from ionized
impurities. There are 2 figures.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy
institut redkometallicheskey promyshlennosti Moskva
(State Design and Planning Scientific Research Institute
of the Rare Metals Industry, Moscow)

SUBMITTED: December 9, 1961 (initially), January 12, 1962 (after
revision)

Card 2/2

37948
S/181/62/004/005/049/055
B163/B138

24.7700

AUTHORS:

Pistul', V. I., and Omel'yanovskiy, E. M.

TITLE:

Electric conductivity of germanium heavily doped with phosphorus

PERIODICAL:

Fizika tverdogo tela, v. 4, no. 5, 1962, 1370-1372

TEXT: The dependence of the electrical conductivity of germanium on the phosphorus concentration has been found to coincide with the corresponding dependence for added arsenic found by Furukawa, (J. Phys. Soc. Jap. 15, 750, 1960). On the other hand, Spitzer, Trumbore and Logan (J. Appl. Phys. 32, 1822, 1961) have found different dependencies for phosphorus and arsenic. The measurements are here repeated carefully in the concentration range from $4 \cdot 10^{18}$ to $4 \cdot 10^{19} \text{ cm}^{-3}$ on precisely ($\pm 0.01 \text{ mm}$) cut cruciform specimens with four "horns", with strong current and magnetic fields exceeding $6 \cdot 10^3$ oersteds. Except for one specimen ($n_p = 4 \cdot 10^{19} \text{ cm}^{-3}$), which follows Spitzer's curve, the phosphorus and arsenic values were found to coincide. To explain the discrepancy with the results of Spitzer and

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Electric conductivity of germanium ...

S/181/62/004/005/049/055
B163/B138

co-workers it is assumed that the author's specimens contained phosphorus in a "second form". This "second form" may be a compound of the $Ge_x P_y$ type or a compound with some other element, oxygen, for instance, or it may be trivalent phosphor. The "second form" shows acceptor properties and partly compensates the electron conductivity. In this case, the concentration determined from Hall measurements is not the same as the concentration of the admixture. There is 1 figure. f

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskey promyshlennosti, Moscow
(State Scientific Research and Project Institute of the Rare Metal Industry, Moscow)

SUBMITTED: February 5, 1962

Card 2/2

40894

24.7000

S/181/62/004/009/034/045
B104/B186

AUTHORS: Rashevskaya, Ye. P., and Fistul', V. I.

TITLE: Effective electron mass in germanium highly doped with arsenic

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2601 - 2603

TEXT: The dependence of the reflection coefficient of Ge of various arsenic concentrations on the wavelength of the incident light was determined with an MKC-12 (IKS-12) infrared spectrometer with MNC-12 (IPO-12) standard attachment for reflection measurements. The coefficient was obtained by comparing the reflection from the specimen with that from an aluminized glass plate (Fig. 1). The effective mass m^+ was determined from the relation

$$\sqrt{\epsilon_0 - n^2 + k^2} = \sqrt{\frac{Ne^2}{m^+ \pi c^2}} \lambda \quad (1),$$

where λ is the wavelength of the incident light, ϵ_0 the dielectric constant of pure Ge, N the impurity concentration, n and k are the real and imaginary parts of the refractive index for which reflectivity

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Effective electron mass...

S/181/62/004/009/034/045
B104/B186

$R = ((n-1)^2 + k^2) / ((n+1)^2 + k^2)$ (2). In the left-hand section of the curves shown in Fig. 1, the condition $k^2 \ll n^2$ is fulfilled. In this section the values of $\sqrt{\epsilon_0 - n^2}$ obtained with the aid of (2) are linearly dependent on λ . The effective electron mass was determined from the slope of this straight line and from (1) (Fig. 2). There are 2 figures.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskooy promyshlennosti AN SSSR, Moskva (State Design and Planning Scientific Research Institute of the Rare Metals Industry AS USSR, Moscow)

SUBMITTED: April 7, 1962

Fig. 1. R versus wavelength for various arsenic concentrations in Ge.

Legend: (4) $N = 3.6 \cdot 10^{19}$; (3) $3.2 \cdot 10^{19}$; (2) $2.5 \cdot 10^{19}$; (30) $1.9 \cdot 10^{19}$; (274) $1.8 \cdot 10^{19}$; (6) $1.5 \cdot 10^{19}$; (1) $1.3 \cdot 10^{19}$; (237) $1.2 \cdot 10^{19}$; (9) $8.3 \cdot 10^{18}$; (11) $4.5 \cdot 10^{18}$.

Card 2/42

43132

S/181/62/004/011/035/049
B108/B102

24,2700

AUTHORS: Fistul', V. I., and Cherkas, K. V.

TITLE: The thermo-e.m.f. of highly doped n-type germanium

PERIODICAL: Fizika tverdogo tela, v. 4, no. 11, 1962, 3288 - 3292

TEXT: The thermo-e.m.f. of germanium single crystals doped with As, Sb, or P nearly to saturation was measured at room temperature using a potentiometer circuit. The experimental values of the differential thermo-e.m.f. α of As-doped germanium for As concentrations n of between $5 \cdot 10^{18}$ and $4 \cdot 10^{19} \text{ cm}^{-3}$ fit on a straight line in the coordinates α versus $\log n$. The inclination of this line is greater here than for germanium samples with a lower impurity concentration. α proved to be dependent on the type of impurity, which was expected since the mechanism of carrier scattering is decisive for the thermo-e.m.f. At equal impurity concentrations, α_{Sb} is greater than α_{As} . Phosphorus-doped samples showed the same thermo-e.m.f. as samples doped with arsenic. According to the theory this should not be the case. It is therefore supposed that P constitutes an

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The thermo-e.m.f. of highly...

S/181/62/004/011/035/049
B108/B102

acceptor-type impurity. There are 2 figures and 1 table.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy
institut redkometallicheskoj promyshlennosti, Moskva (State
Design and Planning Scientific Research Institute of the
Rare Metals Industry, Moscow) ✓

SUBMITTED: May 15, 1962

Card 2/2

S/053/62/077/001/002/003
B117/B112

AUTHORS: Fistul', V. I., Shvarts, N. Z.

TITLE: Tunnel diodes

PERIODICAL: Uspekhi fizicheskikh nauk, v. 77, no. 1, 1962, 109 - 160

TEXT: Western and Soviet studies during the period 1932 - 1961, concerning progress in developing tunnel diodes are reviewed. Special attention is given to the physics of tunnel diodes and their radiotechnical application for high frequencies. The following problems are dealt with: principle of operation of a tunnel diode; tunnel effect of semiconductors; quantitative consideration of the tunnel effect in the p - n junction; physical principles of tunnel diode production; parameters characterizing the tunnel diode (peak current, surplus current, characteristic voltages, negative resistance, capacitance of the p - n junction, time constant, loss resistance, maximum and resonance frequency), designs of tunnel diodes; working conditions of circuits with tunnel diodes and stability problems; measurement of tunnel diode parameters; generators with tunnel diodes; amplifiers with tunnel diodes; some other possibilities of application for tunnel diodes (transformers (mixers), detector, superregenerator); application of tunnel diodes
Card 1/2

Tunnel diodes

S/053/62/077/001/002/003
B117/B112

for physical investigations (direct investigation of the interaction between electrons and phonons, and between electrons and polarons; determination of the mass of charge carriers; evaluation of the tunnel effect probability, tunnel spectroscopy etc.). There are 53 figures, 2 tables, and 130 references: 20 Soviet-bloc, and 110 non-Soviet-bloc. The four most important English-language references are: G. Wade, Proc. IRE v. 49, 880 (1961); L. E. Dickens, C. R. Gneiting, IRE Trans. MMT9, 99 (1961); J. C. Grene, E. W. Sard, Proc. IRE v. 49, 350 (1961); M. D. Montgomery, Proc. IRE v. 49, 826 (1961).

Card 2/2

Solid solutions in the quasi-binary cross-sections of the ternary systems of diagrams of magnesium with group IV elements. K. A. Bol'shakov, Ye. S. Makarov, Ye. A. Sokolova, V. I. Fistul', V. K. Prokof'yeva.

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

Fistul' U.I.

AID Nr. 974-2 22 May

ELECTRON MOBILITY IN STRONGLY DOPED SILICON (USSR)

Omelyanovskiy, E. M., V. I. Fistul', and M. G. Mil'vidskiy. Fizika tverdogo tela, v. 5, no. 3, Mar 1963, 921-927. S/181/63/005/093/032/046

An experimental study has been made of the Hall mobility of electrons in n-type silicon single crystals strongly doped with arsenic and phosphorus (concentration, 10^{17} - 10^{20} cm⁻³). Measurements were conducted at temperatures from 78 to 300°K. Curves of the temperature and concentration dependence of Hall conductivity and of the concentration dependence of specific resistance were obtained. The results show an unexpected difference between the mobility versus concentration curves of samples with arsenic from those of samples with phosphorus at liquid-nitrogen temperatures, despite coincidence of these curves at room temperatures. With low temperatures and large impurity concentrations (above $7 \cdot 10^{19}$ cm⁻³), carrier mobility decreased with increased impurity concentration. The data cannot be explained by the theory of carrier scattering on impurity ions unless a strong screening effect of ions by electrons is assumed to take place at distances closer to the ions than is the case for weakly doped semiconductors.

[BB]

Card 1/1

L 17970-63

ENP(q)/ENT(m)/BDS AFFTC/ASD JD

ACCESSION NR: AP3000635

S/0181/63/005/005/1480/1483

AUTHORS: Andrianov, D. G.; Fistul', V. I.

TITLE: Magnetoresistance in degenerate p-type germanium and silicon ²¹ 56

SOURCE: Fizika tverdogo tela, v. 5, no. 5, 1963, 1480-1483

TOPIC TAGS: degenerate semiconductor, p-type semiconductor, Ge, Se, magnetoresistance, kinetic coefficient, Fermi level

ABSTRACT: The basis of calculation is a simple anisotropic model which assumes a certain number of minimums on an energy surface in quasi-momentum space, as employed in the work of B. Abeles and S. Maiboom (Phys. Rev., 95, 31, 1954). Values of kinetic coefficients were tabulated. From these values curves may be plotted to show dependence of the coefficients on the Fermi level, and a comparison of experimental data with these curves permits one to investigate whether the anisotropy factor in a coefficient changes with increase in degree of degeneracy. Orig. art. has: 1 figure, 1 table, and 12 formulas.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskey promyshlennosti, Moscow (State Scientific-Research and Planning Institute for the Rare-Metal Industry)

Card 1/2

DOMANSKAYA, L.I.; OMEL'YANOVSKIY, E.M.; PISTUL', V.I.; TSIDIL'KOVSKIY, I.M.

Nernst-Ettingshausen effect in heavily alloyed n-type germanium.
Fiz. tver. tela 5 no.10:3046-3048 0 '63. (MIRA 16:11)

1. Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut
redkometallicheskooy promyshlennosti, Moskva, i Institut fiziki me-
tallov AN SSSR, Sverdlovsk.

FISTUL', V.I.; ORZHEVSKIY, O.B.

Nonprobe method for measuring the specific resistance of highly
alloyed semiconductors. Zav.lab. 29 no.11:1327-1329 '63.
(MIRA 16:12)

FISTUL, V.I

AID Nr. 971-20 20 May

**INDUCTIVE PROPERTIES OF SEMICONDUCTOR ELECTRON-HOLE
JUNCTIONS (USSR)**

Iglitsyn, M. I., and V. I. Fistul'. IN: Akademiya nauk SSSR, Doklady, .
v. 149, no. 3, 21 Mar 1963, 577-579. S/020/63/149/003/014/028

Experimental results obtained in the course of a study conducted according to a previously described phase method, of nonequilibrium carrier lifetimes in strongly doped germanium indicate the presence of induction in thin electron-hole junctions. Sample germanium p-n junction diodes with impurity concentrations of $4.6 \cdot 10^{19}$ and $9.5 \cdot 10^{19} \text{ cm}^{-3}$ were used, with an n-type inversion layer introduced into the germanium by a melt of lead with 3 to 10% arsenic. The junctions had a considerable area and a capacitance of 130 to 200 pF. Volt-ampere curves of the junctions show a pronounced tunnel effect, indicating the thinness (of the order of 200 Å) of the junction

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AID Nr. 971-20 20 May

INDUCTIVE PROPERTIES [Cont'd]

8/020/63/149/003/014/028

regions. A plot of voltage versus current phase angle, obtained at a frequency of 2 Mc, shows that the voltage—phase curves of thin junctions have no plateau. The phase decreases with increased voltage, attaining negative phase values; this is interpreted as evidence of induction. The induction values calculated for the samples are at least 1.5 orders less than those of the diode armatures, showing the effect to be a property of the junction itself. The effect is expected to find many applications, particularly in solid-state high-frequency devices.

[BB]

Card 2/2

AID Nr. 985-4 7 June

**POLYTROPY OF IMPURITIES IN n-TYPE Ge AND Si SINGLE CRYSTALS
DOPED WITH LARGE AMOUNTS OF GROUP V ELEMENTS (USSR)**

Fistul', V. I., M. G. Mil'vidskiy, E. M. Omel'yanovskiy, and S. P. Grishina.
IN: Akademiya nauk SSSR. Doklady, v. 149, no. 5, 11 Apr 1963, 1118-1122.
S/020/63/149/005/013/018

A study carried out at the State Scientific Research Institute of the Rare Metals Industry showed that the total impurity content in n-type Ge and Si single crystals doped with large amounts of P or As (impurity content in the melt from which the crystals were grown $> 2 \cdot 10^{20} \text{ cm}^{-3}$) is higher than that which has been determined from the Hall effect. It was concluded that in this case, in contrast to Ge and Si crystals doped with small amounts of group V elements, only a portion of the impurity in the crystal is part of the substitutional solid solution, while the rest is present in other states in which the impurity does not exhibit donor properties. This phenomenon was designated "polytropy of impurities in semiconductors."

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AID Nr. 905-4 7 June

POLYTROPY OF IMPURITIES [Cont'd]

8/020/63/149/005/013/018

It is suggested and, in most instances, shown that polytropy is caused by such factors as 1) the presence of impurities in interstices; 2) the formation of a second phase of the arsenide or phosphide type; 3) the formation of cellular impurity substructures; 4) the deposition of impurities on structural defects; and 5) the formation in the solid solution of such structural complexes as Si_xAs_y or Ge_xP_y . When the impurity is present in the above states, the unsaturated substitutional solid solution is thermodynamically unstable, and it is shown that an additional transfer of impurity atoms into the solid solution takes place with time. This transfer increases the carrier concentration and can be accelerated by heat treatment of the crystals in hydrogen. Further studies of the polytropy of impurities in semiconductors are urged in view of the assumption that the state of impurities in single crystals should determine the life of semiconductors doped with large amounts of impurities.

[BAO]

Card 2/2

L 12668-63

BDS

ACCESSION NR: AP3002876

S/0020/63/150/005/1059/1061

AUTHOR: Chupakhin, M. S.; Glavin, G. G.; Fistul', V. I.

TITLE: Deposits in heavy-alloyed silicon 27

SOURCE: AN SSSR. Doklady*, v. 150, no. 5, 1059-1061 1963

TOPIC TAGS: heavy-alloyed silicon, mass-spectrograph, monocrystalline silicon, defect, structure

ABSTRACT: A method registering the composition of solid substances in a MS-7 mass-spectrograph with double focus and spark ion source was used during an investigation of monocrystalline silicon. Molecules from Si sub 2 to Si sub 7, and in one specimen, Si sub 8, were observed. In order to investigate the mechanism of formation of these deposits, samples of silicon carbide were examined. Lines of polyatomic ions observed on the plate reflect the structure of solid body, i.e., the molecules of silicon corresponding to it are found in the monocrystal and are not products of the association of the pair, since this takes place in the Knudsen effusion cell. It is assumed that a decrease in defects in the structure with formation of localized donor levels in a prohibited zone with comparatively low energy of ionization. "In conclusion, we consider it our pleasant duty to thank

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L 12668-63

ACCESSION NR: AP3002876

Academician A. P. Vinogradov, Corresponding Member of the AN SSSR, N. P. Sazhin,
and Professor Ye. S. Makarov, who took part in discussions of this work and
expressed a series of valuable opinions and observations at various stages of its
execution." Orig. art. has: 3 figures and 1 table. 4

ASSOCIATION: Institut geokhimii i analiticheskoy khimii, im. V. I. Vernadskogo
Akademii nauk SSSR (Institute of Geochemistry and Analytical Chemistry, Academy of
Sciences SSSR)

SUBMITTED: 24Dec62

DATE ACQ: 15Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 002

OTHER: 003

Card 2/2

FISTUL, V. I.; OMELYANOVSKIY, E. M.; ANDRIANOV, D. G.; DAKHOVSKIY, I. V.

"The scattering of electrons in heavily-doped germanium."

report submitted for Intl Conf on Physics of Semiconductors, Paris, 19-24
Jul 64.

ACCESSION NR: APL011730

a/0181/64/006/001/0016/0018

AUTHORS: Cherkas, K. V.; Pistul', V. I.

TITLE: Low temperature measurements of thermoelectromotive force in highly doped n-type germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 16-18

TOPIC TAGS: thermoelectromotive force, doped semiconductor, low temperature property, germanium, current carrier, degeneracy, entrainment

ABSTRACT: This is a continuation of previous work by the authors (FTT, 4, 3288, 1962). The previous work was carried out at room temperature, this at low temperature. The same samples were used. Studies were made on the concentration dependence of the thermoelectromotive force, the concentration dependence of degeneracy, and the temperature dependence of effective mass in n-type germanium doped with arsenic, antimony, and phosphorus. The results are summarized in Figs. 1-3 on the Enclosures. The authors point out that the increase in thermoelectromotive force at concentrations below $2 \cdot 10^{18} \text{ cm}^{-3}$ is apparently due to entrainment,

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ACCESSION NR: AP4011730

but this aspect was not studied. Orig. art. has: 3 figures and 5 formulas.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut
redkometallicheskoj promyshlennosti, Moscow (State Scientific Research Institute
of the Rare-Metal Industry)

SUBMITTED: 05Jun63

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Card 2/5

ACCESSION NR: AFI011730

ENCLOSURE: 01



Fig. 1. Concentration dependence of the thermoelectromotive force in doped Ge; $T = 100\text{K}$

Doped with: 1 - As; 2 - Sb; 3 - P; 4 - Sb (according to data of H. Frederikse, Phys. Rev., 92, 248, 1953); 5 - As (from data of T. H. Geballe and G. W. Hull, Phys. Rev., 94, 1134, 1954).

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ACCESSION NR: APL011730

ENCLOSURE: 02

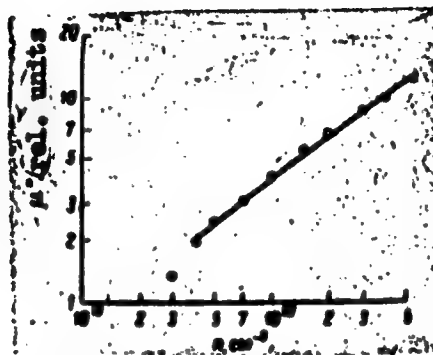


Fig. 2. Dependence of degree of degeneracy in As-doped Ge on carrier concentration; $T = 100K$.

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ACCESSION NR: AP4011730

ENCLOSURE: 03

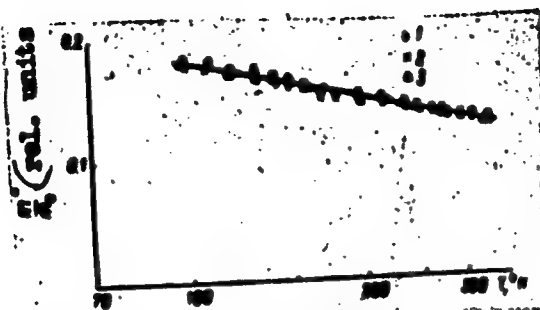


Fig. 3. Temperature dependence of effective mass of the density of state in Ge with different contents of As
1 - $5.3 \cdot 10^{19} \text{ cm}^{-3}$; 2 - $1.4 \cdot 10^{19} \text{ cm}^{-3}$; 3 - $2 \cdot 10^{18} \text{ cm}^{-3}$.

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ACCESSION NR: AP4013506

S/0181/64/006/002/0470/0474

AUTHORS: Andrianov, D. G.; Fistul', V. I.

TITLE: Reluctance of highly doped n type germanium in weak magnetic fields

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 470-474

TOPIC TAGS: reluctance, germanium, n type germanium, magnetic field, weak magnetic field, anisotropy, conduction band, arsenic, arsenic doped germanium, resistivity, Hall constant

ABSTRACT: The authors have measured the reluctance, resistivity, and Hall constant of n-type germanium at 77 and 300K in samples oriented in the $[100]$ and $[110]$ directions. The samples were doped with arsenic in concentrations ranging from 10^{16} to $2 \cdot 10^{19}$ cm⁻³. The samples were oriented by x-ray technique and were cut ultrasonically in the (100) plane along the above indicated crystallographic axes. The dependence of reluctance on magnetic field strength was found to be quadratic for all specimens in the range of magnetic fields tested. The authors conclude that the standard model for the conduction band of four ellipsoids of

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ACCESSION NR: AP4013506

rotation with the principal axes of rotation along the $[111]$ axes remains valid in highly doped specimens. Computations were made on the effective parameter of anisotropy $K (= K_m/K_\tau)$, where $K_m = m_{11}/m_\perp$, and $K_\tau = \tau_{11}/\tau_\perp$ on the assumption that K does not depend on energy. The value of K was found to decline with increase in impurity concentration to some value and then to increase again. "The authors thank V. P. Kasatkina for her careful determination of the crystallographic directions of the investigated samples." Orig. art. has: 9 figures and 5 formulas.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoj promyshlennosti (State Scientific Research and Planning Institute for the Rare-Metal Industry)

SUBMITTED: 10Aug63.

DATE ACQ: 03Mar64

ENCL: 00

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NO REF SOV: 003

OTHER: 007

Card 2/2

ACCESSION NO: AP4028416

S/0181/64/006/004/0974/0980

AUTHORS: Fistul', V. I.; Omel'yanovskiy, E. M.; Tatarov, Z. I.

TITLE: Relations between lattice and impurity scattering in doped germanium and silicon [Reported at the Conference on Degenerate Semiconductors, meeting at the AN SSSR in Moscow, December 1962]

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 974-980

TOPIC TAGS: lattice scattering, impurity scattering, doped semiconductor, carrier mobility, degeneracy, electron gas

ABSTRACT: A way has been found to determine the mobility of current carriers at any degree of degeneracy of electron gas in a semiconductor, considering the simultaneous effects of two types of scattering: at acoustical vibrations of lattice atoms and at ionized impurities. Beginning with the view that there is a relaxation time associated with each of these effects, the authors find the total relaxation time, but show that it is possible to distinguish between the two components. The ratio of one to the other can be obtained by knowing the derived Fermi level and the drift mobility for a pure sample and then by measuring the Hall

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ACCESSION NR: AP4028416

mobility of any doped sample and making use of a table of integrals (given in the paper). Mobilities of current carriers were measured in n-type Ge and Si over a wide range of temperatures (chiefly between 300 and 500 K) and of impurity concentrations (10^{-8} to 10^{20} cm⁻³) to compare computed and experimental results. The results indicate that the two types of scattering may be distinguished: very well in Ge, approximately in Si. Computations show that the Hall factor at 300K for strongly doped Ge and Si is not unity as has generally been thought. Only at 78K, because of a marked increase in the Fermi level, does the Hall factor approach unity for most samples with carrier concentrations greater than 10^{18} cm⁻³. Orig. art. has: 5 figures, 4 tables, and 9 formulas.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskey promyshlennosti, Moscow (State Scientific Research and Planning Institute for the Rare-Metal Industry)

SUBMITTED: 03Apr63

DATE ACQ: 27Apr64

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SUB CODE: EC, SS

NO REF SOV: 007

OTHER: 006

Card 2/2

ACCESSION NR: AP4035085

S/0032/64/000/005/0559/0562

AUTHORS: Omel'yanovskiy, E. M.; Fistul', V. I.

TITLE: Hall factor determination in atomic semiconductors

SOURCE: Zavodskaya laboratoriya, no. 5, 1964, 559-562

TOPIC TAGS: semiconductor, atom oscillation, impurity ion, Fermi statistics, acoustic phonon, relaxation time, Hall mobility, Hall factor

ABSTRACT: The Hall factor was determined analytically under the simultaneous action of two scattering mechanisms: on acoustic atom oscillations of the lattice and on impurity ions. A Fermi statistics was assumed for the particles with an arbitrary degree of degeneracy μ^* . The relaxation times for acoustic phonon and admixture ion scattering are given together with expressions for the drift and Hall mobilities. This leads to an expression for the Hall factor A ($n = A/Rs$, n - concentration of charge carriers, R - Hall constant) given by

$$A = \frac{3}{2} \cdot \frac{\Phi_{ij}(\mu^*, a) \cdot F_{ij}(\mu^*)}{\Phi_s^2(\mu^*, a)}$$

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ACCESSION NR: AP4035085

where $\bar{\Phi}_{9/2}$ and $\bar{\Phi}_3$ are integrals of Fermi distribution functions whose values are determined numerically on the electronic computer "Strela." The results of Hall factor calculations are then given in tabular form for various values of μ^* . The results show $A = 1$ only for $\mu^* > 8$. Orig. art. has: 17 formulas, 2 tables, and 1 figure.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskey promyshlennosti (State Scientific Research and Design Institute of the Rare Earth Metal Industries).

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